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RECORDS OF THE MARINE GENUS *BATHYDRILUS* (OLIGOCHAETA: TUBIFICIDAE) FROM CALIFORNIA, WITH DESCRIPTIONS OF TWO NEW SPECIES

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Abstract.—*Bathydrilus litoreus* Baker, 1983, *B. parkeri,* new species, and *B. rusticus,* new species, are described from subtidal habitats in southern California. *Bathydrilus parkeri* appears closely related to *B. exilis* Erséus & Davis, 1989, a larger species from Hawaii, but its postclitellar setae are not single-pointed as those of the latter taxon. *Bathydrilus rusticus* resembles *B. torosus* Baker, 1983, an intertidal species from British Columbia, but is discriminated by its much different spermathecae.

Baker (1983) described two intertidal species of *Bathydrilus* Cook, 1970, *B. litoreus* Baker, 1983 (from British Columbia and Washington) and *B. torosus* Baker, 1983 (from British Columbia), which are the only members of this genus recorded from the Pacific coast of North America to date. In the present paper, three species of *Bathydrilus* from offshore localities in southern California are treated. One is *B. litoreus,* the other two are new taxa.

The material originates from (1) the Bureau of Land Management (BLM) Outer Continental Shelf Project in the Southern California Bight, placed at the author's disposal by the Allan Hancock Foundation, University of South California, Los Angeles (courtesy, Dr. J. Kudenov; now at University of Alaska, Anchorage); and (2) the Los Angeles County Sanitation Districts benthic sampling off Los Angeles (courtesy, Dr. T. Parker, Joint Water Pollution Control Plant, L.A. County Sanitation Districts). The worms were stained in paracarmine and mounted whole in Canada balsam prior to examination. Types and other material are deposited at the National Museum of Natural History (USNM), Washington, D.C., and the Los Angeles County Museum of Natural History (LACM), Los Angeles, California.

Bathydrilus litoreus Baker, 1983

Bathydrilus litoreus Baker, 1983:2162–2164, figs. 1, 2A.—Erséus 1990:68–69, fig. 13.

New material.—USNM 136578–136580, 3 specimens from Southern California Bight: 1 from Santa Cruz Island (slope of Santa Crus Basin), 260 m, medium to coarse sand (BLM project Sta. no. 80907); 1 from same area and sediment, but 271 m (BLM project Sta. no. 80908); 1 from same area, but 257 m, medium sand with small pebbles (BLM project Sta. no. 80929). LACM, 3 specimens from Southern California Bight: 1 from Tanner Bank, 96 m, fine sand (BLM project Sta. no. 81505); 1 from same area, but 203 m, coarse sand with shell (BLM project Sta. no. 81827); and 1 from San Nicholas Island, 279 m, coarse sand with small rocks (BLM project Sta. no. 84103).

Remarks.—Originally described from intertidal localities in British Columbia and Washington (Baker 1983), this species was recently reported also from subtidal depths (15 m) in Southwestern Australia (Erséus 1990). The new specimens from Southern

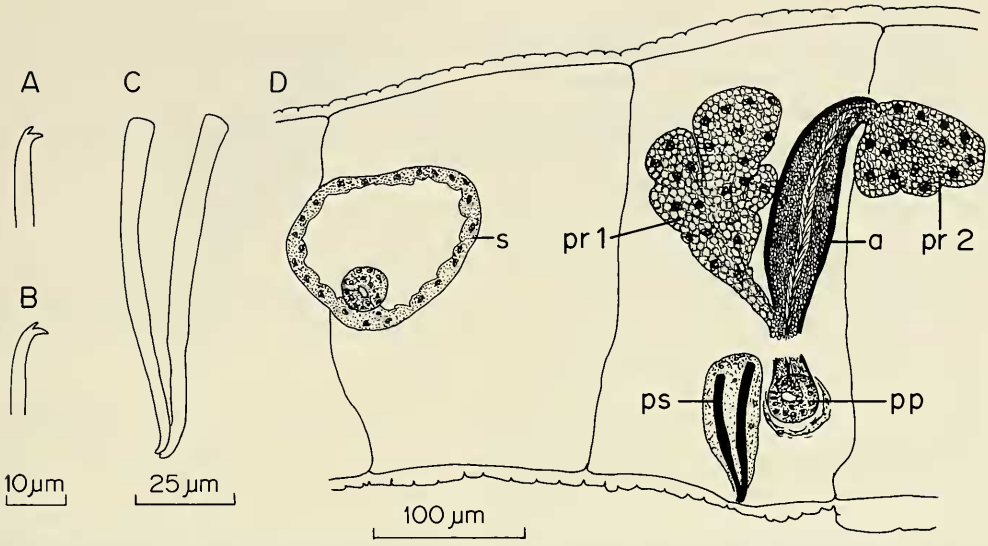

Fig. 1. *Bathydrilus parkeri.* A, Anterior somatic seta; B, Postclitellar somatic seta; C, Penial setae; D, Lateral view of genitalia in segments X–XI. Abbreviations: a, atrium; pp, pseudopenis; pr1, anterior prostate gland; pr2, posterior prostate gland; ps, penial seta; s, spermatheca.

California are from deeper sites, at 96–279 m depth. A brief description of the new material follows:

Length of only complete individual 14.0 mm, about 77 segments; other, incomplete, worms longer, but much stretched. Somatic setae 3 per bundle anteriorly, 2 per bundle in postclitellar segments. Penial setae single-pointed, straight and closely parallel within bundle, 100–140 µm long, 3 per bundle, and enclosed in large, glandular, bilobed sac (see Erséus 1990: fig. 13C). Atria 115–150 µm long, 45–50 µm wide.

With regard to body size, the new worms thus resemble the original B.C./Washington material more than they do the Australian specimens; the latter were 16.5–22.1 mm long with 90–115 segments. The Californian individuals, however, have somewhat smaller penial setae and atria than the previously studied material; in the latter, penial setae were 140–160 µm, atria 170–230 µm long.

In the more northern populations of *B. litoreus,* the penial setae are mostly 2 (occasionally 3–5) per bundle (Baker 1983). In the Australian material there is also some variation in this character, the penial setae mostly 3 (occasionally 2 or 4) per bundle (Erséus 1990). The penial setae of the new material are invariably 3 per bundle.

Distribution and habitat.—California (new record), Washington, British Columbia; also southwestern Australia. Intertidal and subtidal sands, to at least 279 m depth.

Bathydrilus parkeri, new species
Fig. 1

Holotype.—USNM 136573, whole-mounted specimen.

Type locality.—Off Kou radio towers, Palos Verdes Peninsula, Los Angeles, California, 30 m, silty sand (July 1980; Los Angeles County Sanitation Districts benthic sampling station no. 6D).

Paratypes.—USNM 136574, 1 specimen from type locality. LACM AHF 1533, 1 specimen from type locality.

Etymology.—Named for Dr. Thomas Parker (Joint Water Pollution Control Plant, Carson, California), who kindly provided the material.

Description.—Length 10.1–10.9 mm, from about 70 to 78 segments. Width at XI 0.27–0.35 mm. Prostomium elongate. Epidermal glands as large dorsal patches in many segments, well visible in at least one specimen. Clitellum extending over ½X–XII. Somatic setae 40–50 μm long, 2–3 μm thick, 3 per bundle anteriorly, 2 per bundle in postclitellar segments. These setae bifid, with upper tooth shorter and thinner than lower, more pronouncedly so in postclitellar (Fig. 1B) than in anterior segments (Fig. 1A). Penial setae (Figs. 1C; D, *ps*) 2 per bundle, 75–90 μm long, 5–7 μm thick, single-pointed with somewhat curved tips; within bundle, inner ends of setae wider apart than tips. Male pores paired, in line with ventral setae, posteriorly in XI. Spermathecal pores paired in lateral lines, in most anterior part of X.

Pharyngeal glands in IV-VIII(IX), well developed. Some anterior septa, in particular 6/7 and 7/8, thickened, conspicuously muscular. Male genitalia (Fig. 1D) paired. Vas deferens not seen in available material, but appears to enter ectal end of atrium near attachment of anterior prostate gland. Atrium slender and spindle-shaped; erect or somewhat tilted over to posterior, 150–220 μm long, 40–47 μm wide, with 2–3.5 μm thick outer lining of muscles, and ciliated, granulated inner epithelium. Anterior prostate gland attached to ectal end of anterior face of atrium, posterior prostate gland to apex of atrium. Atrium terminating in bulbous, simple, pseudopenis, but details not clear in available material. Spermathecae (Fig. 1D, s) with very short ducts, and oval ampullae, 70–125 μm long, 45-106 μm wide. Lumen of spermathecae with some globules of secretion and an amorphous substance, but no sperm observed (specimens precopulatory?).

Remarks.—*Bathydrilus parkeri* appears closely related to *B. exilis* Erséus & Davis, 1989. The latter, which is known only from Hawaii, also has somewhat curved penial setae with inner ends wider apart than outer tips, heavily muscular anterior septa, and slender, more or less erect atria and somewhat curved penial setae (Erséus & Davis 1989). The posterior setae of *Bathydrilus exilis,* however, are not bifid as those of *B. parkeri* but sharply single-pointed. Moreover, the Hawaiian species is about twice as large (up to at least 26.5 mm, with 149 segments) as the new taxon.

Distribution and habitat.—Known only from type locality near Los Angeles, southern California. Subtidal silty sand, 30 m depth.

Bathydrilus rusticus, new species
Fig. 2

Holotype.—LACM AHF 1527, whole-mounted specimen from type locality.

Type locality.—Tanner Bank, Southern California Bight, 113 m, coarse sand and shells (BLM project Sta. no. 81810).

Paratype.—USNM 136575, specimen from type locality.

Etymology.—Named *rusticus* (Latin for 'simple, plain'), alluding to this species' lack of penial setae.

Description.—Holotype 11.8 mm long, with 67 segments; paratype 9.9 mm, 44 segments. Width at XI 0.23–0.25 mm. Prostomium large, somewhat elongate with rounded tip. Epidermal glands not observed. Clitellum extending over ½X–XII in holotype, poorly developed in paratype. Somatic setae 55–75 μm long, 2.5–3.5 μm thick, 2–3 per bundle anteriorly, 2(3) per bundle in postclitellar segments. Anterior setae (Fig. 2A) bifid, with upper tooth much shorter and thinner than lower. Postclitellar setae with rudimentary upper tooth, or (more commonly?) single-pointed with curved tip (Fig. 2B). Ventral setae of XI (penial setae) absent. Male pores paired, in line with ventral setae, posteriorly in XI. Spermathecal pores paired, immediately ventral to lateral lines, in most anterior part of X.

Pharyngeal glands extending in VIII, but poorly developed. Some anterior septa somewhat thickened, but not conspicuously

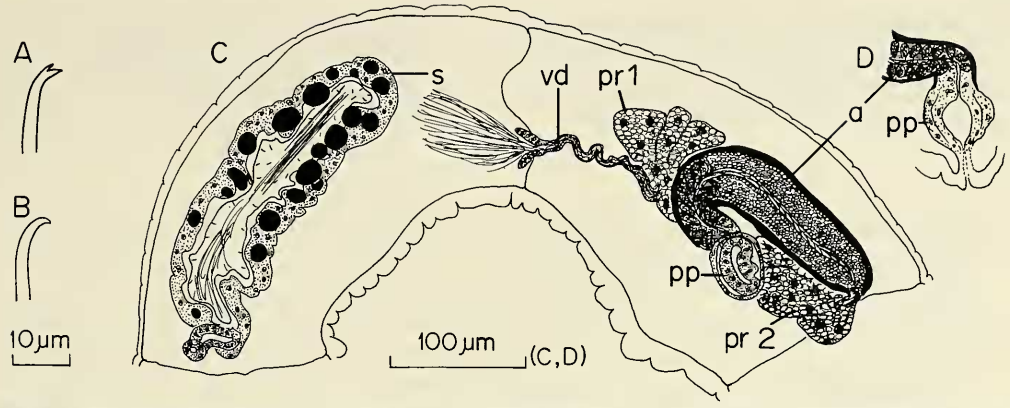

Fig. 2. *Bathydrilus rusticus.* A, Anterior seta; B, Postclitellar seta; C, Lateral view of spermatheca and male genitalia in segments X–XI (one side of holotype); D, Outer end of male duct (other side of holotype). Abbreviations: vd, vas deferens; other abbreviations as in Fig. 1.

muscular. Male genitalia (Fig. 2C, D) paired, partly extending into XII in paratype. Vas deferens inconspicuous, 3–8 μm wide, somewhat coiled, and appars to enter ectal end of atrium near attachment of anterior prostate gland. Atrium slender, tilted over to posterior, 150–230 μm long, 47–50 μm wide, with 2.5–5 μm thick outer lining of muscles, and ciliated, histologically bipartite inner epithelium; ental (longer) part of atrium evenly granulated; granules of ectal (shorter) part aggregated in discrete 'packages'. Anterior prostate gland attached to ectal end of anterior face of atrium, posterior prostate gland to apex of atrium. Atrium terminating into hollow pseudopenial sac (best observed at one side of holotype; Fig. 2D), but details not clear in available material. Spermathecae (Fig. 2C, s) with distinct ducts, 30–45 μm long, about 20 μm wide, and elongate ampullae, 200–260 μm long, 40–75 μm wide. Walls (and parts of lumina?) of spermathecal ampullae with large globules of secretion; each ampulla containing an amorphous substance in which bundled sperm appear to be cemented.

Remarks.—*Bathydrilus rusticus* appears closely related to *B. torosus* Baker, 1983, an intertidal species from British Columbia. Both taxa have setae with much reduced upper teeth, muscular, posteriorly directed atria, and elongate (although morphologically different) spermathecae, but they lack penial setae. According to Baker (1983), the atria of *B. torosus* open to the exterior on the ventral aspect of large papillae; it is possible that these papillae are everted pseudopenes of a kind similar to those present in *B. rusticus* (see Fig. 2D).

It is not clear from Baker's (1983) description whether the thick-walled ectal part of the spermathecae of *B. torosus* is an unusually long spermathecal duct, or whether it is merely a part of the ampulla, but his fig. 3C seems to suggest the former alternative. Be it any way, in *B. rusticus,* the spermathecal ducts are very short and narrow, and clearly set off from the elongate ampullae, and the sperm are arranged in slender bundles inside an amorphous mass in the spermathecae, not in roundish spermatozeugmata (termed "spermatophores" by Baker) as in *B. torosus.*

Distribution and habitat.—Known only from type locality in the Southern California Bight (NE Pacific). Subtidal coarse sand, 113 m depth.

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